

Appln No. 09/835,937

Amdt date August 14, 2003

Reply to Office action of June 25, 2003

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Previously Amended) A detector array formed on a high resistivity semiconductor material having a first side and a second side, the detector array comprising:

an entrance window formed on the first side, the entrance window being used to receive radiation; and

an array of detectors formed on the second side, one or more of the detectors being used for detecting the radiation received via the entrance window,

wherein the entrance window forms a junction with the high resistivity semiconductor material, and the detectors comprise pixelated ohmic contacts.

2. (Original) The detector array of claim 1, wherein one or more detectors are surrounded by one or more junction separation implants, the junction separation implants surrounding the detectors in a form of a grid or rings.

3. (Original) The detector array of claim 1, wherein the entrance window is coupled to one selected from a group consisting of a scintillator, a scintillator array, a light guide or a diffuser for providing the radiation to the detector array via the entrance window.

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4. (Original) The detector array of claim 1, wherein one or more detectors are coupled to readout electronics.

5. (Original) The detector array of claim 2, wherein the semiconductor material is high resistivity n-type silicon, the entrance window is p+ type, the array of detectors are n+ type, and the junction separation implants are p+ type.

6. (Original) The detector array of claim 2, wherein the semiconductor material is high resistivity p-type silicon, the entrance window is n+ type, the array of detectors are p+ type and the junction separation implants are n+ type.

7. (Original) The detector array of claim 1, wherein the array of detectors comprise radiation hardened detectors, and is used to detect at least one radiation selected from a group consisting of particles, light, x-ray, and gamma-ray.

8. (Original) The detector array of claim 1, wherein both the entrance window and the junction separation implants are reverse biased, and the reverse biasing generates in the semiconductor material a first depletion region originating at the first side and a plurality of second depletion regions originating at the second side with a pinch off region formed between the first depletion region and at least one of the second depletion regions.

Claims 9-12 (Previously Canceled).

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13. (Previously Amended) A detector array formed on a semiconductor material having a first side and a second side, the detector array comprising:

an entrance window formed on the first side, the entrance window being used to receive radiation;

an array of detectors formed on the second side, one or more of the detectors being used for detecting the radiation received via the entrance window; and

a grid surrounding one or more detectors,

wherein the entrance window forms a junction with the semiconductor material, and the detectors comprise pixelated ohmic contacts, and

wherein the grid surrounding the detectors comprises an inner grid surrounding one or more detectors and an outer grid surrounding the inner grid, wherein a first pixel size is achieved by biasing the inner grid and a second pixel size is achieved by biasing the outer grid, wherein the second pixel size is larger than the first pixel size.

14. (Original) The detector array of claim 1, wherein the entrance window is coupled with a CsI(Tl) scintillator.

15. (Original) The detector array of claim 14, wherein the entrance window is directly coupled with the CsI(Tl) scintillator.

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16. (Original) The detector array of claim 14, wherein the entrance window is coupled with the CsI(Tl) scintillator via an interface that functions as a light guide between the entrance window and the CsI(Tl) scintillator.

17. (Original) The detector array of claim 1, wherein the entrance window is coupled with one selected from a group consisting of CdWO<sub>4</sub>, NaI(Tl), LSO and BGO scintillators.

18. (Original) The detector array of claim 1, wherein the entrance window is directly coupled with one selected from the group consisting of CdWO<sub>4</sub>, NaI(Tl), LSO and BGO scintillators.

19. (Original) The detector array of claim 1, wherein the entrance window is coupled with one selected from a group consisting of CdWO<sub>4</sub>, NaI(Tl), LSO and BGO scintillators via an interface that functions as a light guide between the entrance window and the selected one of the scintillators.

20. (Currently Amended) The detector array of claim 1, wherein the entrance window is [~~optimized~~] suitable for receiving light from a CsI(Tl) scintillator.

21. (Currently Amended) The detector array of claim 1, wherein the entrance window is [~~optimized~~] suitable for receiving light from one selected from a group consisting of CdWO<sub>4</sub>, NaI(Tl), LSO, BGO scintillators.

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22. (Previously Amended) A method of forming a detector array on a high resistivity semiconductor material having a first side and a second side, the method comprising the steps of:

forming an entrance window on the first side, the entrance window is for receiving radiation; and

forming an array of detectors on the second side, one or more of the detectors are used for detecting the radiation received via the entrance window,

wherein the entrance window forms a junction with the high resistivity semiconductor material, and the detectors comprise pixelated ohmic contacts.

23. (Original) The method of forming a detector array of claim 22, the method further comprising the step of:

forming one or more junction separation implants, the junction separation implants surrounding the detectors in a form of a grid or rings.

24. (Original) The method of forming a detector array of claim 22, the method further comprising the step of:

coupling the entrance window to one selected from a group consisting of a scintillator, a scintillator array, a light guide or a diffuser for providing the radiation to the detector array via the entrance window.

25. (Original) The method of forming a detector array of claim 22, the method further comprising the step of:

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coupling one or more detectors to readout electronics.

26. (Original) The method of forming a detector array of claim 22, the method further comprising the steps of:

reverse biasing the entrance window; and

reverse biasing the junction separation implants,

wherein the reverse biasing generates a plurality of depletion regions in the semiconductor material with a pinch off region between at least one of the depletion regions located between the pinch off region and the first side and the rest of the depletion regions located between the pinch off region and the second side.

Claims 27-30 (Previously Canceled).

31. (Previously Amended) A method of forming a detector array on a semiconductor material having a first side and a second side, the method comprising the steps of:

forming an entrance window on the first side, the entrance window is for receiving radiation;

forming an array of detectors on the second side, one or more of the detectors are used for detecting the radiation received via the entrance window; and

forming a grid that surrounds one or more detectors,

wherein the entrance window forms a junction with the semiconductor material, and the detectors comprise pixelated ohmic contacts, and

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wherein the grid surrounding the detectors comprises an inner grid surrounding one or more detectors and an outer grid surrounding the inner grid, wherein a first pixel size is achieved by biasing the inner grid and a second pixel size is achieved by biasing the outer grid, wherein the second pixel size is larger than the first pixel size.

32. (Previously Amended) A composite detector array comprising a plurality of detector arrays, wherein at least one of the detector arrays includes a detector array formed on a high resistivity semiconductor material having a first side and a second side, the detector array comprising:

an entrance window formed on the first side, the entrance window being used to receive radiation; and

an array of detectors formed on the second side, one or more of the detectors being used to detect the radiation received via the entrance window,

wherein the entrance window forms a junction with the high resistivity semiconductor material, and the detectors comprise pixelated ohmic contacts.

Claim 33 (Previously Canceled).

34. (Previously Added) The detector array of claim 1, wherein the high resistivity semiconductor material has a resistivity between 10 ohm-m to 200 ohm-m.

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35. (Previously Added) The method of claim 22, wherein the high resistivity semiconductor material has a resistivity between 10 ohm-m to 200 ohm-m.

36. (Previously Added) The method of claim 32, wherein the high resistivity semiconductor material has a resistivity between 10 ohm-m to 200 ohm-m.



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**Amendments to the Drawings:**

The attached sheets of drawings include changes to FIGs. 1-5 (previously, FIGs. 1-2 and 4-6) as well as new FIGs. 6 and 7. These sheets replace the original sheets including Fig. 1-6.

Attachment:        Replacement Sheets (FIGs. 1-5 and new FIGs 6-7)  
                      Annotated Sheets Showing Changes (FIGs 1-6).